

SOIL AND SITE EVALUATION REPORT

PAR FORE PROPERTY CITY OF FITCHBURG, DANE COUNTY, WISCONSIN

November 21, 2007

Prepared For:

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NRC Project # 007-0275-01

A handwritten signature in black ink, appearing to read "D. Roberts", is written over a horizontal line.

David C. Roberts, PSS
Soil Investigations, LLC

For:

Neil Molstad, CPSS/PSS
Environmental Scientist/Soils

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INTRODUCTION

Natural Resources Consulting, Incorporated (NRC) performed an initial site evaluation of the Par Fore Property to determine suitability for stormwater runoff infiltration. The site is located in Sections 1 and 12 T.6N., R.9E., City of Fitchburg, Dane County, Wisconsin.

The purpose of the initial site evaluation is to identify areas that may be suitable for stormwater runoff infiltration. The initial site evaluation includes both screening (Step A) and field verification (Step B) of potential infiltration areas within the Project Area. The State of Wisconsin has regulatory authority to maintain and improve quality of waters within the state including non-agricultural runoff under Chapter 281.16(2) Wisconsin State Statutes. Runoff pollution performance standards are established under NR 151 Wisconsin Administrative Code under regulatory authority by the Wisconsin Department of Natural Resources (WDNR). The performance standards include prohibitions and technical guidance for the potential implementation of stormwater infiltration devices.

The WDNR has additional stormwater management requirements and standards under NR 216 Wisconsin Administrative Code. In addition, the City of Fitchburg and/or Dane County will have additional regulatory authority through stormwater runoff management or infiltration ordinances.

Site Description

The Project Area is located in the south central part of Dane County. This portion of the county contains soils associated with Horicon Member of the Holy Hill Formation of the Green Bay lobe of the Laurentide Ice Sheet deposited during the last part of the Wisconsin Glaciation. The soils in the project area formed mainly in sandy loam or loamy sand till, as well as, associated deposits of sand and gravel deposited by glacial meltwater and clay, silt, and fine sand deposited in glacial lakes.

METHODS

The initial site evaluation was completed using the criteria and methods outlined in the WDNR Conservation Practice Standard 1002, Site Evaluation for Stormwater Infiltration (2002). The standard identifies methods to characterize potential infiltration sites and screen for exclusions and exemptions; establishes requirements for the selection and siting of an infiltration device and infiltration rates; and defines requirements for site evaluation.

The site evaluation procedure consists of four steps for locating the optimal areas for infiltration and for properly sizing infiltration devices. The initial site evaluation includes screening (Step A) and field verification (Step B) of potential infiltration areas with the Project Area.

Step A: Initial Screening

The initial screening identifies potential locations for infiltration devices. The purpose of Step A is to identify exclusions and exemptions and to determine where field work is needed in Step B. To ensure the protection of groundwater, infiltrating runoff from some areas is prohibited. These prohibited areas, referred to as exclusions, are outlined in NR 151.12(5)(c)5. Generally exclusions include some industrial facilities; fueling and vehicle maintenance areas; areas in proximity to karst features (sinkholes, springs, fractured bedrock); areas of limited separation of between the bottom of an infiltration system and seasonal high groundwater or bedrock; areas in proximity to private and community water system wells; areas where contaminants are of a concern; and areas where the soil medium does not contain the specified fines content. Although infiltration may be prohibited within the above areas, this does not mean that it is not necessary to infiltrate water from these areas.

Exempted areas are not required to meet the infiltration requirements and are outlined in NR 151.12(5)(c)6. Exemptions include areas with infiltration rates less than 0.6 inches/hour; parking areas and access roads less than 5,000 square feet for commercial development; redevelopment sites; in-fill development sites less than 5 acres; infiltration areas where soil is frozen; and commercial, industrial, and arterial residential roads. As with the above excluded areas, an area designated as exempt from infiltration standards does not mean that it is not necessary to infiltrate water from these areas.

The initial step in the site evaluation of the development site included a review of the following resources:

- USGS 7.5 minute Wisconsin quadrangle map
- NRCS Soil Survey of Dane County, Wisconsin
- NRCS hydric soils list for Dane County
- Wisconsin Wetland Inventory (WWI) map for the area
- Bureau for Remediation and Redevelopment Tracking System (BRTTS)
- GIS Registry of Closed Remediation Sites
- WGNHS Bulletin 95, Pleistocene Geology of Dane County, Wisconsin

These resources provide information on site characteristics and considerations for locating potential infiltration areas and potential excluded and exempted areas. Site characteristics and considerations include slopes greater than 20%; potential soil infiltration capacities; soil parent material; depth to seasonal high groundwater; presence of endangered species habitat; presence of floodplain or fringe; approximate hydric soil and wetland locations; excluded areas due to potential groundwater contamination; exempted areas from infiltration requirements; and potential impact to adjacent properties. The site information and characteristics are used to determine where field work is required for Step B.

Step B: Field Verification

The field verification process is required to confirm the initial screening information. Data collected in the field include the identification of slopes greater than 20%; soil profile descriptions and parent material; depths to seasonal high water table and bedrock; location of hydric soils and wetlands; and potential excluded and exempted areas.

Soil pits are dug to a depth to determine infiltration capacity characteristics, depth to seasonal high groundwater, and depth to bedrock. Typically, several pits are dug to a depth of 10 to 15 feet and located in areas to adequately characterize subsurface conditions within the Project Area.

Soil profile descriptions are written in accordance with the descriptive procedures, terminology, and interpretations as prescribed by the USDA-NRCS Field Book for Describing and Sampling Soils, v2.0 2002. The descriptions include profile thickness and boundary, Munsell soil color notation, mottles and/or redoximorphic feature color, abundance, size, and contrast; USDA textural class with rock fragment modifiers; soil structure, grade, and shape; soil consistence, root abundance and size; and occurrence to saturated soil, groundwater, bedrock, or disturbed soil.

RESULTS

Table 1 is a list of the soils mapped in the *Soil Survey of Dane County, Wisconsin*, for the Project Area (Figure 2). Any hydric soils and soils with hydric inclusions are shown in bold.

Table 1. Soil Map Units Identified at the Property.

SYMBOL	SOIL MAP UNIT	CLASSIFICATION	DRAINAGE CLASS	HYDRIC PART
DnB	Dodge silt loam, 2-6%	Typic Hapludalfs	well drained	not hydric
DnC2	Dodge silt loam, 6-12% eroded	Typic Hapludalfs	well drained	not hydric
MdC2	McHenry silt loam, 6-12% eroded	Typic Hapludalfs	well drained	not hydric
MhC2	Military loam, 6-12% eroded	Typic Hapludalfs	well drained	not hydric
RaA	Radford silt loam, 0-3%	Fluventic Hapludolls	Somewhat poorly	Hydric inclusions
ScB	St Charles silt loam, 2-6%	Typic Hapludalfs	well drained	not hydric
ScC2	St Charles silt loam, 6-12% eroded	Typic Hapludalfs	well drained	not hydric
TrB	Troxel silt loam, 1-4%	Typic Argiudolls	Well & mod well drained	Hydric inclusions
VrB	Virgil silt loam, 1-4%	Udolic Ochraqualfs	Somewhat poorly	Hydric inclusions

The WDNR Bureau for Remediation and Redevelopment Tracking System (BRTTS) and GIS Registry of Closed Remediation Sites did not identify any previous contaminant discharges or spills within the general vicinity of the Project Area.

Field Verification

An on-site field study was conducted on November 16, 2007 by Neil Molstad of NRC and on November 19, 2007 by David C. Roberts of Soil Investigations, LLC. A total of twenty four backhoe pits were evaluated. The soil profile descriptions from these test pits are included in Appendix A. The location of these test pits on the site is provided in Figures 2 and 3. The areas determined to meet soil infiltration standards as per NR 151 are shown on Figure 3.

The Project Area has nearly level to sloping relief. The field investigation focused on corroborating the existing soil survey data indicating a silty mantle underlain with sandy loam till over the entire site.

CONCLUSIONS

NRC performed an initial site evaluation of the Par Fore Property site to determine suitability for stormwater runoff infiltration.

The purpose of the initial site evaluation is to identify areas that may be suitable for stormwater runoff infiltration. The initial site evaluation includes both screening (Step A) and field verification (Step B) of potential infiltration areas within the Project Area. The State of Wisconsin has regulatory authority to maintain and improve quality of waters within the state including non-agricultural runoff under Chapter 281.16(2) Wisconsin State Statutes. Runoff pollution performance standards are established under NR 151 Wisconsin Administrative Code under regulatory authority by the Wisconsin Department of Natural Resources (WDNR). The performance standards include prohibitions and technical guidance for the potential implementation of stormwater infiltration devices.

Seasonal high groundwater limits the suitability for stormwater infiltration within parts of the Project Area. Soil pits 2, 3, 4, 7, 8, 12, & 20 had evidence of seasonal saturation where vertical hydraulic conductivity is restricted. Soil pits 5, 16, 17, 18, 21, 23, & 24 had evidence of saturation believed to be from groundwater. Soil pits 16, 17, 18, 23, & 24 contain hydric soils.

Most of the site is suitable for infiltration of stormwater. However, the glacial sediments are quite variable over short distances. Soil pits 5, 8, 9, 10, 12, 13, 14, 15, & 22 are considered to be underlain with gravelly loamy sand to gravelly fine sandy loam till. Soil pits 3, 4, and 6 are considered to be underlain with sand and gravel outwash. Soil pits 1, 2, 7, 16, 17, 18, 20, and 21 are considered to be underlain with lacustrine deposits, generally strata of silt loam to fine sand. Soil pits 23 and 24 are underlain with hard sandstone bedrock at approximately 10 feet. Soil pit 11 had weathered sandstone at approximately 8 feet.

Soil pits 7, 8, 12, 16, 21, 23, and 24 have 7 to 23 inches of recent alluvium over older soils.

REFERENCES

DeLorme 3-D TopoQuads, 1999; United States Geological Survey, *Wisconsin 7.5 Minute Series (Topographic) Maps*.

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REPORT FIGURES

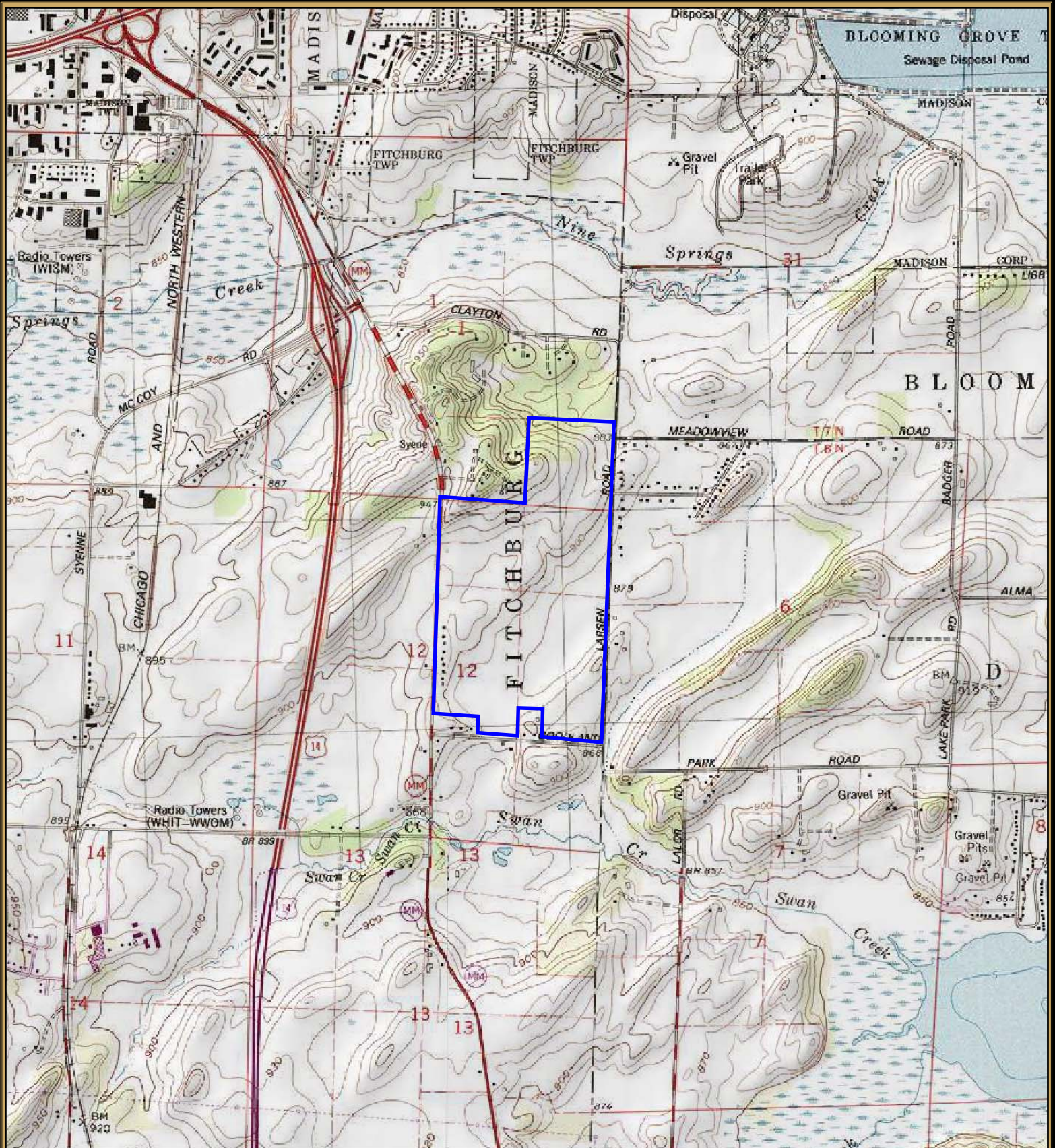
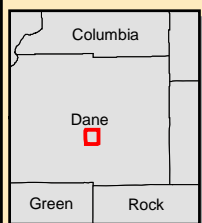


FIGURE 1. PROJECT LOCATION & TOPOGRAPHY
Par 4 Property - Sveum Enterprises



Location

Sections 1 & 12, T6N, R9E,
 City of Fitchburg, Dane Co., WI

Project Information

NRC Project Number #: 007-0275-01
 Modified December 3, 2007

0 1,000 2,000 Feet

Legend

 Project Location

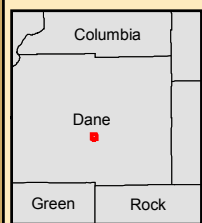


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FIGURE 3. SOIL INFILTRATION EXHIBIT
Par 4 Property - Sveum Enterprises



Location

Sections 1 & 12, T6N, R9E,
 City of Fitchburg, Dane Co., WI

Project Information

NRC Project Number #: 007-0275-01
 Modified December 12, 2007

0 375 750 Feet

Legend

- Project Location
- + Soil Pit Locations
- Suitable for Infiltration
- Limitations to Infiltration
- 24K Hydro Layer
- Town Line
- Section Line



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APPENDIX A
SOIL PROFILE DESCRIPTION DATA SHEETS

[illegible]

dsrob@verizon.net

SOIL DESCRIBED BY: Neil Molstad compiled by D. Roberts

Project Number: 007-0275-02

Date: 11/16/07

Soil Pit #: 2

Soil Map Unit: ScC2 St. Charles silt loam, 6 to 12% slopes, eroded

Veg/crop:

Classification:

Slope:

Parent Material: silt loam loess overlying stratified silty/loamy outwash

Hydric Soil:

Elevation:

Position:

**** Field Indicator(s):**

Drainage Class:

** "Field Indicators of Hydric Soils" - version 6

Est. Seasonal

Saturation:

Observed

Groundwater:

* NR 151 Technical Standard 02/04

Additional Notes:

design infil rate from Rawls, 1998

No bedrock was observed. The substratum consists of a thin layer of till underlain with stratified loamy sand to silt loam lacustrine deposits. Indicators of wetness at 105" probably associated with permeability, not groundwater.

[illegible]

[illegible]

dsrob@verizon.net

SOIL DESCRIBED BY: Neil Molstad compiled by D. Roberts

Project Number: 007-0275-01-002

Date: 11/16/07

Soil Pit #: 4

Soil Map Unit: DnC2, Dodge silt loam, 6 to 12% slopes, eroded

Veg/crop:

Classification:

Slope:

Parent Material: sandy loam till.
--

Hydric Soil:

Elevation:**Position:**

**** Field Indicator(s):**

Drainage Class:

** "Field Indicators of Hydric Soils" - version 6

Est. Seasonal

Saturation:

Observed

Groundwater:

* NR 151 Technical Standard 02/04

Additional Notes:

design infil rate from Rawls, 1998

This soil is underlain with outwash sand and gravel at 50". Evidence of saturation at 33" because of restricted permeability.

[illegible]

[illegible]

SOIL INVESTIGATIONS LLC**608-697-0443**dsrob@verizon.net**SOIL DESCRIBED BY:** David Roberts, PSS 117**Client:** Par 4 Property**Project Number:** 007-0275-01-002**Date:** 11/19/07

Soil Pit #: 8	Soil Map Unit: TrB, Troxel Silt loam, 2 to 6% slopes		
Veg/crop:	Classification:		
Slope:	Parent Material: silty alluvium	Hydric Soil:	
Elevation:	Position:	** Field Indicator(s):	
	Drainage Class:	** "Field Indicators of Hydric Soils" - version 6	
	Est. Seasonal Saturation:		
	Observed Groundwater:		

* NR 151 Technical Standard 02/04

Additional Notes:

This soil is underlain with fine sandy loam till at 158". Indicators of wetness are related to permeability, not groundwater.

Horizon	Depth (inches)	Matrix Color (moist)	Texture	Unified class.	Structure (Gr / Size / Type)	Consistence	Coarse Fragments (% & kind)	Redox Features (abund/size/contrast/color)	Boundary	Design Infil. Rate (inches / hour)*
Ap	0-11	10YR2/2	sil	ml	2m&fsbk	fr			as	0.13
Ab11	11-16	10YR2/1	sil	ml	2mgr	fr			as	0.13
Ab12	16-24	10YR3/3	sil	cl	2msbk	fr			cw	0.13
Bt1	24-34	7.5YR3/4	sil	cl	2m&copr	fr		c2d 5YR4/6	cw	0.13
Bt2	34-46	7.5YR3/4	sicl	cl	2m&copr	fi		c2p 5YR4/6 & f2d 5Y5/2	aw	0.04
2C	46-105	7.5YR4/4	sicl	cl	m	fi		f1p 7.5YR5/8 & f2d 5Y5/1	aw	0.04
3C	105-158	10YR6/4	s	sp	sg	lo			aw	3.60
4C	158-180	7.5YR4/4	fsl	sm	m	fr	5% gr			

[illegible]

dsrob@verizon.net

SOIL DESCRIBED BY: Neil Molstad compiled by D. Roberts

Project Number: 007-0275-01-002

Date: 11/16/07

Soil Pit #: 11

Soil Map Unit: ScB, St Charles silt loam, 2 to 6% slopes

Veg/crop:

Classification:

Slope:

Parent Material: sandy loam till

Hydric Soil:

Elevation:

Position:

**** Field Indicator(s):**

Drainage Class:

** "Field Indicators of Hydric Soils" - version 6

Est. Seasonal

Saturation:

Observed

Groundwater:

* NR 151 Technical Standard 02/04

Additional Notes:

design infil rate from Rawls, 1998

This soil is underlain with weathered sandstone bedrock at 95".

[illegible]

SOIL INVESTIGATIONS LLC**608-697-0443**dsrob@verizon.net**SOIL DESCRIBED BY:** Neil Molstad compiled by D. Roberts**Client:** Par 4 Property**Project Number:** 007-0275-01-002**Date:** 11/16/07**Soil Pit #:** 12**Soil Map Unit:** VrB, Virgil silt loam, 1 to 4% slopes**Veg/crop:****Classification:****Slope:****Parent Material:** sandy loam till**Hydric Soil:****Elevation:****Position:****** Field Indicator(s):****Drainage Class:****** "Field Indicators of Hydric Soils" - version 6****Est. Seasonal****Saturation:****Observed****Groundwater:***** NR 151 Technical Standard 02/04****Additional Notes:**

Evidence of saturation at 32 inches. May be related to permeability and not groundwater.

design infil rate from Rawls, 1998

Horizon	Depth (inches)	Matrix Color (moist)	Texture	Unified class.	Structure (Gr / Size / Type)	Consistence	Coarse Fragments (% & kind)	Redox Features (abund/size/contrast/color)	Boundary	Design Infil. Rate (inches / hour)*
Ap	0-11	10YR2/2	sil	ml	2msbk	fr			cs	0.13
A12	11-17	10YR3/1	sil	cl	2fpl	fr			cs	0.13
Ab	17-28	10YR2/1	sil	cl	2mgr	fr			cs	0.13
A2	28-32	10YR4/2	sil	cl	2msbk	fr			cs	0.13
Bt1	32-41	10YR5/3	sil	cl	2msbk	fr		c1d 10YR4/6	cw	0.13
Bt2	41-65	10YR4/3	sicl	cl	1cosbk	fi		m1d 10YR4/6 & m2d 10YR5/2	gs	0.04
C	65-86	10YR4/3 & 10YR5/1	sicl	cl	m	fi		m2d 10YR4/6	as	0.04
2C	85-150	7.5YR5/4	grsl	sm	m	fr				0.50

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

